

Claims

1. An x-ray diagnostic imaging system comprising:
  - an x-ray irradiation unit for irradiating an object to be examined with x-rays;
  - an x-ray diaphragm unit disposed in a direction of x-ray irradiation of the x-ray irradiation unit and shielding the irradiated x-rays except for the x-rays irradiated on a portion used for obtaining an x-ray image of the object to be examined;
  - an x-ray diaphragm setting unit for variably setting the x-ray shielded portion to be shielded by the x-ray diaphragm unit;
  - an x-ray flat panel detector opposed to the x-ray irradiation unit via the object to be examined and imaging x-rays passed through the object to be examined as an x-ray image;
  - an image processing unit for subjecting the x-ray image obtained by the x-ray flat panel detector to an image processing; and
  - a display unit displaying the x-ray image subjected to the image processing by the image processing unit, wherein the image processing unit comprises:
    - a calculation unit reading out data of an x-ray detection element of the x-ray flat panel detector corresponding to the x-ray shielded portion shielded by the x-ray diaphragm unit which is variably set by the x-ray diaphragm setting unit and

calculating a line noise component from the read out data of the x-ray detection element; and

a line noise correction unit correcting a line noise of the x-ray image based on the line noise component calculated by the calculation unit.

2. The x-ray diagnostic imaging system according to claim 1, wherein the calculation unit includes interaction of a data portion read out as the line noise component from the x-ray flat panel detector with the x-ray diaphragm unit variably set by the x-ray diaphragm setting unit.

3. The x-ray diagnostic imaging system according to claim 1, wherein the image processing unit further comprises a correction execution switching unit switching to execution / non-execution of the line noise correction based on an x-ray condition set to the x-ray irradiation unit.

4. The x-ray diagnostic imaging system according to claim 1, wherein the image processing unit further comprises a scattered x-ray elimination processing unit identifying an area in which x-rays scattered by the object to be examined are generated on the x-ray flat panel detector corresponding to the x-ray shielded portion variably set by the x-ray diaphragm setting unit and eliminating the identified scattered x-ray generation area from the line noise component calculation performed by the calculation unit.

5. The x-ray diagnostic imaging system according to

claim 1, further comprising a second x-ray diaphragm unit disposed between the object to be examined and the x-ray flat panel detector in addition to the x-ray diaphragm unit and shielding the x-rays scattered by the object to be examined, wherein the x-ray diaphragm setting unit variably sets a size of an x-ray shielded portion shielded by the second x-ray diaphragm unit.

6. The x-ray diagnostic imaging system according to claim 1, further comprising:

an operation unit to be used by an operator for setting an x-ray condition to the x-ray irradiation unit, an aperture condition of the x-ray diaphragm unit to the x-ray diaphragm setting unit, and an operation condition to the image processing unit; and

a control unit driving the x-ray irradiation unit, the x-ray diaphragm setting unit, and the image processing unit based on the conditions set by the operation unit.

7. The x-ray diagnostic imaging system according to claim 6, wherein the control unit causes the x-ray irradiation unit to irradiate the object to be examined with x-rays corresponding to the x-ray condition set by the operation unit; the x-ray flat panel detector detects x-ray image data of x-rays projected by the x-ray irradiation unit and passed through the object to be examined and data of the shielded portion shielded by the x-ray diaphragm unit; and the calculation unit

calculates a line noise component from the shielded portion data detected by the x-ray flat panel detector.

8. The x-ray diagnostic imaging system according to claim 6, wherein the line noise component obtained by the calculation unit is a predetermined statistical value of data of the x-ray detection element of the x-ray flat panel detector, the data corresponding to the x-ray shielded portion variably set by the x-ray diaphragm setting unit.

9. The x-ray diagnostic imaging system according to claim 6, wherein the control unit controls the correction execution switching unit switching to execution / non-execution of the line noise correction based on the x-ray condition set by the operation unit.

10. The x-ray diagnostic imaging system according to claim 6, wherein the control unit controls the scattered x-ray elimination processing unit identifying an area in which x-rays scattered by the object to be examined are generated on the x-ray detection element of the x-ray flat panel detector corresponding to the x-ray shielded portion variably set by the x-ray diaphragm setting unit and eliminating the identified scattered x-ray generation area from the line noise component calculation performed by the calculation unit.

11. The x-ray diagnostic imaging system according to claim 6, further comprising a second x-ray diaphragm unit disposed between the object to be examined and the x-ray flat

panel detector in addition to the x-ray diaphragm unit and shielding the x-rays scattered by the object to be examined, wherein the control unit controls a size of an x-ray shielded portion shielded by the second x-ray diaphragm unit by the use of the x-ray diaphragm setting unit.

12. The x-ray diagnostic imaging system according to claim 1, wherein the line noise component obtained by the calculation unit is a predetermined statistical value of data of the x-ray detection element of the x-ray flat panel detector, the data corresponding to the x-ray shielded portion variably set by the x-ray diaphragm setting unit.

13. The x-ray diagnostic imaging system according to claim 12, wherein the predetermined statistical value is an average value.

14. The x-ray diagnostic imaging system according to claim 12, wherein the predetermined statistical value is a median.

15. The x-ray diagnostic imaging system according to claim 12, wherein the predetermined statistical value is a value obtained by combining plural statistical values including the average value and the median.